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ABSTRACT

Until the end of the last century the school textbook served only one purpose, which was to educate; today, faced with competition from the media, it also must be attractive. The development of the textbook over the last century has been characterized, on one hand, by greater diversity, and hence greater complexity, in the typographical methods designed to classify and establish a hierarchy of themes; and, on the other hand, by the growing use of illustrations and color. The typography of a textbook takes part in the didactic message: layout, choice of typeface, and various typographical procedures (boxes, screens, etc.); isolated sections of text to which differences in status and interpretation are allocated; changes in style or boldness of type; and the use of color highlight essential ideas. The reader must master whole sets of often implicit codes that provide a structure for the different elements, at times a difficult procedure. In fact, the reading of a textbook requires an often complex progression through the text, based on the not always obvious role the designer has assigned to the different elements making up the chapter, texts, and illustrations, notably. (Contains 20 references.) (DB)

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ASPECTS OF DESIGN

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The textbook was once the prime means by which people were taught, but today it must compete with other media (magazines, television, films and comics) which have one thing in common - the attraction of pictures and colours. So the role of the school textbook is no longer simply to instruct younger generations, it must now find favour. After a brief examination of the historical development of the textbook since the end of the 19th century we shall go on to indicate the consequences that these changes may have on the behaviour of the reader.

I. HISTORICAL OUTLINE

Throughout most of the 19th century, school textbooks hardly differed from any other type of book: layout was classical and austere, typography was weighty and unvaried, the sole illustrations being the odd vignette. In the 1870s, educational and psychological theory began to develop, gradually prompting writers and publishers to adapt their books for the younger, scholastic readership. This new development did not go unnoticed by contemporaries: "The school textbook of today has an altogether more agreeable aspect", wrote the publisher Eugène Delalain in 1889. "Even the cover is becoming elegant; one is charmed even before one opens it and a brief perusal of its pages does not diminish this effect".

This transformation arose not simply from educational necessities, but also from technical advances which, by reducing the cost of production (cost being a vital factor), meant that printing methods hitherto reserved for de luxe publications could now be used. The combination of these two factors prompted textbook publishers to diversify layout and to vary the typography in order to establish a hierarchy in the themes presented; the multiplication of bodies, the use of bold type and italics, aimed to make reading less tiring for children, particularly younger children, to make the notions expressed clearer and easier to memorise. The increasingly frequent use of illustrations was no longer for simply decorative or emotional purposes; it introduced a concrete element, the educational functions of which became vital, as will be seen later.

The historical development of the textbook, however, was not linear - given the time it took to produce books and the number of years they remained in use up until 20 or 30 years ago (both "innovative" and more traditional books could be present in a classroom at any one time). With this proviso we may now retrace some of the main characteristics of its development, taking as examples history and geography textbooks published in France.

In the 1880s, photoengraving gradually replaced manual engraving techniques for line drawings. By rendering half-tones, the first screened blocks allowed paintings to be reproduced directly, so that publishers no longer had to rely systematically on artists. The use of colour, which for reasons of cost had hitherto been confined to the occasional inset in history and mainly geography textbooks, became more and more frequent: the 29th edition of "Deuxième année de géographie, ... la France", by P Foncin published by Armand Colin in 1896, thus included 88 chromophotograph maps. Photographic reproductions, still a rarity before the First World War, became more common after 1920, and through successive editions of "Cours de géographie" by Schrader

and Gallouédec, published by Hachette, the original engravings were gradually replaced by blocks - albeit virtually illegible - without layout being affected in any way. The will to innovate took precedence over educational considerations. This was not an isolated case.

Although textbooks unquestionably became more attractive from the 1880s onwards, innovation was often at the expense of legibility. In "Éléments de géographie: cours moyen," by H Lemonnier and F Schrader, published by Hachette in 1883, the text is laid out in three columns with the same justification, separated by a faint line; in addition to the text itself, the columns also incorporated the chapter numbers, their headings, sub-headings, numbered exercises and footnotes. The proliferation of typographical variations (nine different bodies on one page, the use of italics and bold type) undermined the orders of importance it was supposed to establish. This frequent type of excess eventually died out after the First World War, and the text would usually be laid out in two columns, with the different sections separated by faint lines and a more sober typography.

From 1930 onwards textbooks tended less and less to be modelled on books for adults, and "the textbook revolution" was upon us. Although advances in photography techniques appeared to mean that artists' drawings were no longer needed for the production of textbooks, publishers would call on renowned artists to illustrate and beautify school books that were unattractive if they compared them with illustrated magazines, by now in vogue. As publishers became aware that children's reading was in a separate category, so the aesthetic function of the illustrator came to the fore, the illustrator's name appearing on the cover. For instance, the author of one of the principal collections of geography textbooks in the inter-war period, Jean Brunhes, requested the artist Roger Broders to produce broad illustrations of his "dominant geographical ideas", and the maps in his books, published by Hatier, were specially re-drawn so as to make them easier to read. Similarly, Mame publications brought out in 1937 "Leçons de géographie. Cours préparatoire", designed as a veritable children's picture-book.

Little by little, pictures began to take over the textbook and its cover. The size and number of books and illustrations began to grow, with three-times more primary school history textbooks being published between 1880 and 1945 and a quadrupling of the number of secondary school history books, between 1905 and 1938, reflecting the increasing reliance on documentation in the teaching of history.

After the Second World War, the widespread use of new techniques (offset, heliogravure) brought production costs down, and there was more competition from advertising posters, magazines etc. The proportion of pictures increased further, at the expense of the text. Illustrations now account for, on average, 50% of the contents of the textbook, so that it bears more and more resemblance to a collection of documents or an encyclopaedia. From the 1960s onwards, the use of colour became commonplace and, in the last decade, colour has begun to spread into the text itself, so that colour characters, typographical bases on screened backgrounds, and coloured bands help demarcate the different elements in the page and express the theme hierarchies in visual terms.

This development of the textbook corresponds to general trends in society: today we live in a world dominated by pictures and colour, and surveys have shown (1) that the younger generation would be reluctant to work with books boasting neither. But do the functions that textbook designers ascribe to illustrative documents, or the implicit or explicit codes used for expressing theme hierarchies visually (layout, colophons, colour), match the expectations and aptitudes of their principal users - pupils and teachers?

II. TEXT AND PARATEXT

As had already been observed, the written text no longer occupies such a predominant position in present-day textbooks. The space not occupied by the body of the text, which has constantly increased in recent years, is referred to as the co-text - headings, sub-headings, page numbers, footnotes, references, blank spaces, and illustrations. These diverse elements to which the text frequently makes reference (notes, indications such as "see document No. ...") constitute the paratext.

1. The text

In novels, the text is usually laid out in a single font and body, and arranged in paragraphs with the same justification only separated by a space between lines, by a new paragraph or indentation. Frequently, but not invariably, the paragraphs are arranged into chapters, usually carrying a number.

This text arrangement presupposes uninterrupted reading, but the same does not hold good for a textbook, which is consulted, or referred to: people read novels, but dip into textbooks.

Reading is organised into units, or lessons, and these correspond to chapters, part-chapters, or even a double spread which is taken in at a glance. Within one reading unit (and without mentioning frequent references to other chapters) the publisher of the textbook uses a variety of typographical methods in order to express the theme hierarchies under which the reading is organised in visual terms. It would be true to say that a textbook's typography plays a part in the didactic message. Typographical features (font, body, style, bold print), the use of boxes or screened backgrounds, increasingly in colour, layout (in columns, margins, etc), and special justifications, isolate and differentiate sections of text which have each been allocated a different status: the main body of the lesson, summary, an evaluative numbered exercise and a revision section, etc.

Similarly, within a given section of text, different typographical methods (change of style or thickness of type, underlining, linespacing, indentation etc) are used to highlight certain words or certain essential ideas, either to facilitate their understanding and memorising, or to encourage the reader to refer to another part of the lesson or book (the use of italics, for example, will indicate that the meaning of a word is given in a glossary and invite the pupil to refer to it, or will refer him to an index, etc).

(1) Eg the Smith and Rousey survey.

These different methods form the structure of the text, allocate different sections of the text a fixed status, instill different attitudes in the mind of the reader, form a theme hierarchy, and ultimately orientate the reading. The reader must comprehend the system, but the route he follows depends largely on the extent to which he has mastered the various codes utilised.

Mastering these codes is no easy matter, especially for younger pupils:

- Even if they are well conceived, properly explained and repetitive, certain methods of text arrangement involve numerous and complex code systems.
- Certain codes are implicit because their designer feels them to be "natural".
- "Learning to use a textbook", ie explaining all the codes being employed, is a methodological exercise rarely practised in class, as the codes often appear "natural" to the teacher.
- Different publishers use different code systems: pupils not only have different textbooks for different subjects, they change them every year, so that during their school lives they have to cope with whole series of code systems which may well be coherent but which are nonetheless extremely diverse. What is true for code systems is also true for sheer volume: it is just as difficult to use several different textbooks as it is to squeeze them into a satchel!

2. The paratext

As we have already observed, the paratext comprises composite elements such as the running headline, headings and sub-headings, pagination etc and a set of documents generally known as illustrations, whose common feature is that they are two-dimensional. Here we shall mainly deal with illustrations.

a. Illustration typology

In theory, everything that is neither linguistic signal nor mathematical symbol is illustration. In practice, linguistic signals (words or numbers) organised on the page so as to express the relationship between data and ideas in visual terms (eg a double-entry table showing annual wheat production in the USSR), constitute a representation of reality calling on both language and imagery.

A scale of declining iconicity, devised by Abraham Moles, classifies images according to the degree to which they truly represent an object. In a textbook, where the illustrations are necessarily two-dimensional, it is possible to distinguish pragmatically - as suggested by François Richaudeau - three principal types of image, from the most to the least realistic:

- photographs;
- drawings, provided they seek to be realistic;
- diagrams, ie drawings designed with a high degree of abstraction. Charts, histograms and maps etc come into this category.

Photographs:

Not only are photographs, and colour photographs in particular, the most realistic type of reproduction, they are also the most attractive - witness their widespread use in the world of advertising.

It is however, true, that the photograph is not objective: the centering, the choice of shot (and the consequent exclusion of what is out of shot), the angle, lighting, scale etc reflect the view of the photographer. Moreover, different technical methods at the development stage may considerably alter the degree to which a photograph is realistic, while some photographs, such as those taken by satellite, are the result of special technology and reproduce a type of reality that is not immediately accessible.

Drawings:

Drawings appear to be more faithful to reality, in that they eliminate irrelevant elements and stress essential aspects which permit identification. In short, they are invariably easier to decipher. While photographs give precise examples, drawings aim to generalise. This may clearly be seen in geography textbooks. In history textbooks, however, the subjectivity of the author plays an essential role: the use of a propaganda poster or a caricature refers the reader to the intention of the author, an all the more difficult exercise since the reading of such documents implies knowledge of both the context and the system of code representation used at the time of their conception.

Diagrams:

The feature common to diagrams is their way of modifying reality so as to make it more concrete, more accessible. Diagrams reduce objects to their elementary geometric form; the elements of a diagram may be analogical, or stylised imitations of objects or symbolic equivalents. Isolated from any realistic context, they may thus be comprehended in their relationship in space or time. In this way, the diagram renders abstract data (age pyramid, economic growth ...) visual. The diagram highlights structure and logical relationships; it aims to be universal.

Maps, histograms and charts, frequently employed in history and geography textbooks, belong to this category.

b. Reading a picture

While the reading of a text is linear and continuous, the perception of a picture is global and simultaneous. The meaning of a picture results from a reading cycle based on the identification and association of non-continuous visual signals. Since these are scattered, the picture is open to a greater number of interpretations than is the text: it is polysemous, ie it permits a whole set of possible interpretations.

Over and above the denotative meaning that applies the form - perception code (I perceive), the analogical representation code (I recognise) and the naming code (I give a name), the picture projects additional meanings on a much greater scale than does the text: this

is the connotative meaning and it depends partly on the reader (memory, culture, imagination etc), partly on the internal organisation of the picture (composition, colours, contrasts etc) and its situation in the context of the page (size, presence or absence of other pictures, layout, etc).

Like the text, the picture is a means of communication which implies a sender and a receiver. In textbooks, a distinction needs to be made between two different categories of picture: first, pictures entirely designed and elaborated by the author (maps and diagrams), and aimed at an academic readership - pupils or teachers; second, pictures which the author has not created himself (tables, caricatures, posters etc), and which were not originally designed for schoolchildren. It is fair to say that as the teaching of history has moved from the simple incantation of facts to the statement of problems, so the status of the picture in the message conveyed by history has been enhanced: the picture is no longer regarded as a mirror in which a past age is reflected, but as a communicative act by the society which produced it, in short a historical source. Nevertheless, it must not be inferred that we are dealing with simple reproduction of images; the author, too, plays an essential role, by choosing not only the document but also the scale, centering and the page layout, and thereby orientating the way in which it is read.

A number of methods are frequently employed to reduce the polysemy of the image.

- through the text: anchoring.

The use of a heading, a key, a commentary or a numbered exercise establishes one meaning, out of all the possible meanings. Language imposes a meaning on a picture and excludes irrelevant interpretations.

- through other pictures: the montage.

Mounting a sequential series of fixed images may also help to reduce polysemy: taken together, and with the effect they have on one another, the meaning of pictures is wholly different from the meaning they would convey if they were in isolation. It is the global perception which dictates interpretation.

It would be dangerous, in short, to imagine that illustration saves on words.

3. The inextricable link between text and co-text

How do the written text (linguistic signals) and illustrations (the iconic system) dovetail? Is the picture superfluous in the context of the text? Does the picture refer to the text, or the text to the picture?

The picture can have several functions within a textbook:

- Motivation function. The power of attraction plays a vital role. Photographs are usually in colour, and their size and the blank space around them are essential; they are closely bound up with the text.

- Decorative function. Pictures are chosen for aesthetic and not educational reasons, and have little or nothing to do with the text. This type of picture should not appear in textbooks.
- Information function. Clarity and legibility are at a premium, with polysemy reduced by the use of captions or montage. The picture has a separate role from the text, which it complements or clarifies.
- Reflection function. The picture is used in conjunction with an interrogatory key or with an actual numbered exercise.
- Exemplary function. The picture gives an example. This is a non-decorative function, the picture producing a paraphrase of the text and serving as a cultural reference.

In conclusion, textbook design arises from a judicious balance between diverse elements, which call on the reader to decipher a set of complex codes simultaneously.

RESEARCH POINTERS

In the light of references that we have encountered or research work that has come to our attention, three points stand out:

- a. Researchers are principally interested in the "legibility" of textbooks (choice of lexis, character size or font, inter-letter spacing, line length);
- b. Imagery in textbooks, is more often studied in connection not with its functions but with its content (analysis of the picture of a social group, for example);
- c. When it is the educational role of illustrations that is studied, the textbooks being analysed are usually scientific (especially in the case of biology textbooks, which include an abundance of diagrams and drawings).

As for the relationship between text and paratext (essentially illustration), much less research has been carried out, to our knowledge, into history, geography or civics textbooks (see bibliography).

A number of questions could be discussed, on the basis of concrete examples.

- Do textbooks contain too many illustrations? Are all illustrations vital? Is the systematic use of imagery not liable to make illustrations less effective, with an adverse effect on motivation and memorisation?
- Are the functions ascribed to the picture by the book designers spelt out? If not, do the functions appear clearly?
- May the number of colophons and codes be an impediment to reading? Should there be fewer? Should pupils receive special training to give them the skills they need? Should publishers be encouraged to harmonise the codes they use?
- Are the objective characteristics of a picture always indicated (scale, date, origin, complete or partial document, etc ...)?

A P P E N D I X**International databank for research into textbooks**

In preparing this paper I consulted several databanks (ERIC, FRANCIS, O.C.L.C., EMILE, etc) and many specialised educational bibliographies.

Research into the design and use of school textbooks is apparently under way in a great many countries but complete details are not at the moment available.

This is unfortunate for more than one reason: it means wasting time, and that the documentation is incomplete; the same type of work is duplicated; research is mainly carried out on a national level, as is clear from the appended bibliography listing most of the works and articles that I was able to consult.

As a way of remedying this situation:

I call on you to take part in the creation of an international databank for research into textbooks

to list, and analyse in summary form all research work being carried out in Europe and possibly the rest of the world into textbooks. The technical and intellectual means necessary for the elaboration of such an instrument are available in my Institute.

Please do not hesitate to contact me if you would like more details about this project or if you care to discuss ways in which it may be realised.

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ABSTRACT

Up until the end of the last century the school textbook only served one purpose, which was to educate; today, faced with competition from the media, it must also be attractive. The development of the textbook over the last century has been characterised, on the one hand, by greater diversity - and hence greater complexity - in the typographical methods designed to classify and establish a hierarchy of themes, and, on the other hand, by the growing use of illustrations and colour.

The typography of a textbook takes part in the didactic message: layout, choice of typeface and various typographical procedures (boxes, screens etc) isolate sections of text to which different status and interpretation are allocated; changes in style or boldness of type and the use of colour highlight essential ideas. The reader must master whole sets of often implicit codes which provide a structure for the different elements; at times a difficult process.

Illustrations currently make up almost one-half of the contents of textbooks. Varying degrees of realism may be observed, with the photograph the most realistic, followed by the drawing and then the diagram; all have specific characteristics. Generally speaking, however, the reading of an image, given that it is global and, unlike the text, non-linear, requires particular skills: the denotative meaning is supplemented by a whole set of different signals (connotative meanings) that are partly dependent on the internal arrangement of the picture and its situation in the context, but also on the reader's character. Different methods, such as anchoring (captions) or the use of montage (the physical linking of a number of pictures), are used to guide the reader through the text.

In fact, the reading of a textbook requires an often complex progression through the text, based on the (not always obvious) role the designer has assigned to the different elements making up the chapter, texts, and illustrations, notably.